PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 :
H04Q 7/30, H04L 12/56

A1

(11) International Publication Number: WO 00/64204

(43) International Publication Date: 26 October 2000 (26.10.00)

(21) International Application Number: PCT/SE00/00742

(22) International Filing Date: 19 April 2000 (19.04.00)

(30) Priority Data:
9901381-5 19 April 1999 (19.04.99) SE

(71) Applicant: TELIA AB [SE/SE]; Mårbackagatan 11, S-123 86 Farsta (SE).

(72) Inventor: SILLÉN, Torbjörn; Klubbacken 25, S-129 39 Hägersten (SE).

(74) Agent: PRAGSTEN, Rolf; Telia Research AB, Vitsandsgatan 9, S-123 86 Farsta (SE).

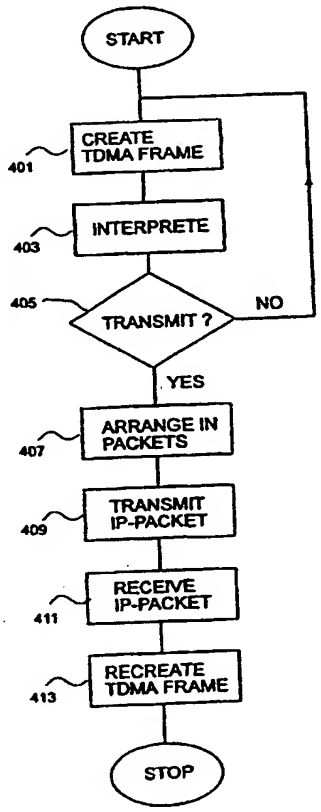
(81) Designated States: EE, LT, LV, NO, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

(54) Title: METHOD AND DEVICE FOR AVOIDING TRANSMISSION OF REDUNDANT INFORMATION IN A DIGITAL COMMUNICATION NETWORK

(57) Abstract

A procedure and a device for control of transmission of information in a transmitting subnetwork in a digital time division multiplex mobile communication system is presented. The subnetwork transmits frames containing information from a station (201) in a radio subnetwork to an adaptation unit (213) in the transmitting subnetwork and is characterised in that it includes the steps: reception of information frames from the radio subnetwork, interpretation of at least a fraction of the content in the information frames, at which the interpretation at least determines one type of frame for each of the received information frames, at which the type of frame is one of at least three types of frames, at which a first type of frame is a speech frame that includes sound information, a second type of frame is a silence frame that includes silence information, and a third type of frame is a faulty frame that includes a frame error indicator, transmission of the information in the received information frames, at which the transmission is made depending on the interpretation.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania
AM	Armenia
AT	Austria
AU	Australia
AZ	Azerbaijan
BA	Bosnia and Herzegovina
BB	Barbados
BE	Belgium
BF	Burkina Faso
BG	Bulgaria
BJ	Benin
BR	Brazil
BY	Belarus
CA	Canada
CF	Central African Republic
CG	Congo
CH	Switzerland
CI	Côte d'Ivoire
CM	Cameroon
CN	China
CU	Cuba
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
ES	Spain
FI	Finland
FR	France
GA	Gabon
GB	United Kingdom
GE	Georgia
GH	Ghana
GN	Guinea
GR	Greece
HU	Hungary
IE	Ireland
IL	Israel
IS	Iceland
IT	Italy
JP	Japan
KE	Kenya
KG	Kyrgyzstan
KP	Democratic People's Republic of Korea
KR	Republic of Korea
KZ	Kazakstan
LC	Saint Lucia
LI	Liechtenstein
LK	Sri Lanka
LR	Liberia
LS	Lesotho
LT	Lithuania
LU	Luxembourg
LV	Latvia
MC	Monaco
MD	Republic of Moldova
MG	Madagascar
MK	The former Yugoslav Republic of Macedonia
ML	Mali
MN	Mongolia
MR	Mauritania
MW	Malawi
MX	Mexico
NE	Niger
NL	Netherlands
NO	Norway
NZ	New Zealand
PL	Poland
PT	Portugal
RO	Romania
RU	Russian Federation
SD	Sudan
SE	Sweden
SG	Singapore
SI	Slovenia
SK	Slovakia
SN	Senegal
SZ	Swaziland
TD	Chad
TG	Togo
TJ	Tajikistan
TM	Turkmenistan
TR	Turkey
TT	Trinidad and Tobago
UA	Ukraine
UG	Uganda
US	United States of America
UZ	Uzbekistan
VN	Viet Nam
YU	Yugoslavia
ZW	Zimbabwe

METHOD AND DEVICE FOR AVOIDING TRANSMISSION OF REDUNDANT INFORMATION IN A DIGITAL COMMUNICATION NETWORK

TECHNICAL FIELD

The present invention relates to procedures and devices for control of transmission of information in a transmitting subnetwork in a time division multiplex mobile communication system.

BACKGROUND

Mobile communication systems, such as GSM, can broadly be divided into two different subnetworks. A radio subnetwork and a (packet) transmitting subnetwork consisting of more or less fixed terrestrial connections between the radio subnetwork and public telecommunication networks. In the radio subnetwork, information is exchanged between mobile telephone stations and radio base stations via a radio interface. The radio base stations transmit the information from the radio subnetwork to units in the transmitting subnetwork, which in their turn transmit the information to public telecommunication networks, or back to mobile telephone stations in the radio subnetwork.

Well known to the expert is that the difference in supply, and by that the cost, of transmission resources in the radio subnetwork in comparison with the transmitting subnetwork is great. The radio resources are usually very limited and by that expensive. A general aim at construction and operation of mobile communication systems consequently is that the degree of utilisation of the resources in the radio subnetwork, for instance in form of the time slots in time division multiplex systems such as GSM, shall be as great as possible.

One method of increasing the utilisation of resources in a radio subnetwork where the communication is in form of

traditional telephone calls, is to utilise the fact that calls between persons to a great extent contains time intervals of silence.

In digital mobile communication systems, the information that is transmitted between the in the system included units is divided into so called frames. Frames are sequences of information bits, the length of which can vary between different types of systems. The physical transmission of these frames is made in time division multiplex systems, such as GSM, in the time slots in one for the expert well-known way.

In order to avoid unnecessary use of radio resources, for instance the time slots in the radio interface between mobile station and radio base station, the mobile telephone station can analyse the sound information that is generated by a user. If the analysis finds that the user is silent, a synthetic silence information is crated in the frames, at which only a fraction of the frames are allowed to be transmitted via the radio interface. The transmission of the frames consequently are made in a broken sequence of frames, which means that the load of the time slots is reduced.

After reception in the radio base station, an unbroken sequence of frames are recreated, which, irrespective of whether they contain sound or silence information, then are transmitted via reserved connections to other units in the transmitting subnetwork.

A plurality of radio base stations are usually connected to a base control station, which results in that a plurality of reserved connections are utilised to transmit silence information with a high level of redundancy. This identifies a problem: How avoid transmission of redundant,

and by that unnecessary, information frames in a transmitting subnetwork in a mobile communication system ?

DESCRIPTION OF THE INVENTION

One aim of the invention is to solve the problem: How avoid transmission of redundant, and by that unnecessary, information frames in a transmitting subnetwork in a mobile communication system ?

The invention achieves this aim by interpreting the frame information and transmiting this depending on this interpretation. More exactly, the problem is solved as claimed in patent claim number one, in which is presented a procedure for control of transmission of information in a packet switched subnetwork in a digital time division multiplex mobile communication system. The subnetwork transmits frames containing information from a station in a radio subnetwork to an adaptation unit in the transmitting subnetwork and is characterised in that it includes the steps:

- reception of information frames from the radio subnetwork;
- interpretation of at least a fraction of the content in the information frames, at which the interpretation at least determines one type of frame for each of the received information frames, at which the type of frame is one of at least three types of frames, at which a first type of frame is a speech frame that includes sound information, a second type of frame is a silence frame, which includes silence information, and a third type of frame is a faulty frame, which includes a frame error indicator;
- transmission of the information in the received

information frames, at which the transmission is made depending on the interpretation.

One advantage of the invention is that it allows a reduction of the utilisation of resources in a transmitting subnetwork, which means higher efficiency, and consequently a lower cost.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 shows a schematic representation of a digital communication system in which the present invention is intended to be used.

Figure 2 shows a schematic block diagram over a device according to the invention.

Figure 3 illustrates schematically information frames that are transmitted according to the invention.

Figure 4 shows a flow chart over a method according to the invention.

PREFERRED EMBODIMENTS

Figure 1 illustrates in a schematic way a mobile communication system 100 connected with an external telephone network 103 of traditional (PSTN) kind, an external data network 104, which is exemplified by an ISDN network, and a second mobile communication system 105 of a generic (PLMN) type.

For the sake of clarity, a typical GSM-system is used to illustrate the invention. Consequently both terminology and

the general network structure are known to the expert in the field. However, the selection of GSM as illustration should not be regarded as a limitation. The invention is applicable in all telecommunication networks in which there is a possibility to sense/read silence in an established speech connection and as a result of the sensing/reading limits the amount of transmitted silence information.

The mobile communication system 100 is divided into two subnetworks, a radio subnetwork 101, and a transmitting subnetwork 102. In the radio subnetwork 101 there is a first 110 and a second 112 mobile terminal in radio contact via respective radio interface 114, 116, with a first 118 and a second radio base station 120. Certainly a real radio subnetwork includes more than two mobile terminals. Especially should be observed that each of the radio base stations 118, 120 normally manages connections with a number of tens of mobile terminals at a time.

For the sake of clarity, the borderline between the radio subnetwork 101 and the transmitting subnetwork 102 is illustrated by a dashed borderline between them. However, it will by the following detailed description be evident that that certain functions in the radio base stations 118, 120 constitute a part of the transmitting subnetwork 102 in which the invention is realised.

Each of the radio base stations 118, 120 are connected via a first 122 and a second fixed connection 124 to a base control station 126. The base control station 126 has, among other things, as its task to collect transmission traffic of comparatively low transmission speed from the majority of the radio base stations, to transmission traffic with comparatively high transmission speed to a mobile services switching centre 128. As Figure 1 clearly illustrates, at least one more base control station 136,

with additional connections 138 to radio base stations, is connected to the mobile services switching centre 128.

A second mobile services switching centre 130 serves as a gate for traffic to the other networks 103,104,105. The mobile communication system 100 also can include more mobile services switching centres, as is indicated by connections 132 at the second mobile services switching centre 130.

As is well known within the field, connections are set up, held, and disconnected between subscribers in the shown networks 100,103,104,105. Even if only mobile terminals 110,112 are shown, it is well known that subscribers can be connected to any of the networks, and be connected with each other in more or less just any combinations.

The Figures 2 and 3 illustrate more in detail a speech connection between a first terminal and a second terminal that is established and controlled according to the invention. As is shown in Figure 2, the first terminal is a mobile terminal 201 in the radio subnetwork (101 in Figure 1), and the second terminal is a telephone 219 in a telephone network 217. The transmission of information that is relevant in this context is the transmission that is directed from the mobile terminal 201 to the telephone 219. In order to increase the clarity, a GSM network structure has been selected for this example.

According to known technology, information, preferably digitised speech generated by a terminal user, is transmitted from the mobile terminal 201 via a radio interface 203 to a radio base station 205. The speech information is digitally represented in speech frames, the content of which is transmitted in physical channels in form of time slots in the radio interface. The information

is transmitted via a first gate 207, and a digital network 209, to a base control unit 213, through a second gate 211. The first 207 and the second gate 211 are illustrated as a part of the radio base station 205, respective the base control unit 213. These gates 207, 211, however, can be physically separated units and be in physical connection with other units by known technology.

Further, the information is transmitted according to known technology to the second terminal 219, via a mobile services switching centre 215, the function of which also includes a gate function for connection to the telephone network 217.

The transmission via the radio interface 213 utilises the within GSM well known technology of discontinuous transmission (DTX). This means that the mobile terminal 201 detects and analyses the sound that the user produces and transmits information frames depending on whether sound or silence is detected. Sound is transmitted in continuous speech frames, but silence is transmitted discontinuously, that is, less frequent than speech frames, in so called silence frames. The transmitted frames include an indicator (SP-indicator) about which type of information they contain, at which an information frame containing speech has an SP-indicator the value of which is other than zero, and silence frames are indicated by a zero. Further, the content of the frames represents the sound the silence that is detected, and for the silence information an indicator, SID-indicator, is used, the value of which is used to categorise the content of the transmitted silence information.

The application of this DTX-technology has, as has already been mentioned, as its aim to reduce unnecessary transmission, on the resource limited radio interface, of

frames the contents of which is only silence. After reception in the radio base station 205, the information from the received speech and silence frames are allocated in so called TDMA-frames, which are schematically illustrated in Figure 3.

Figure 3 shows a sequence of TDMA information frames 300, which, according to known technology, are generated in the radio base station (205 in Figure 2). An appointed frame 301 contains an information field 303, and a signalling field 305. The information field contains speech information, silence information, or data information, from the mobile terminal 201. The signalling field contains signalling information intended for other units in the network. Reception of the TDMA information frames is made in the base control station 213, which in its turn forwards the information to receiving terminal 219 via the mobile services switching centre 215 and the telephone network 217.

According to the main idea of the invention, however, not all silence information is transmitted between the radio base station 205 and the base control unit 213. In the first gate 207, the TDMA information frames 300 are analysed with regard to their contents, as will be described below. The information is rearranged in IP data packets according to well known TCP/IP, alternatively UDP/IP, technology and is transmitted via an IP-network 209 to the second gate 211, in which the TDMA information frames 300 are recreated and forwarded to the base control unit 213.

In order to with greater clarity illustrate the processing of the information at transmission from the radio base station 205 to the base control unit 213, a method according to the invention will be illustrated with

reference to Figure 4. The method is, for instance, realised by suitably adapted software existing in the radio base station (205 in Figure 2), and the first gate (207 in Figure 2) and the second gate (211 in Figure 2) and the base control unit (213 in Figure 2).

In an initial step 401, a TDMA-frame (301 in Figure 3) containing information received from the mobile terminal (201 in Figure 2) is created. As has been described above, the information can include speech information as well as silence information, at which identification of the different types of information is made by the SP-indicator and the SID-indicator, the values of which are also incorporated in the TDMA-frame.

In an interpretation step 403, the SP-indicator and the SID-indicator are interpreted to make possible a decision about transmitting the TDMA-frame further to the base control unit (213 in Figure 2). Certainly are in this interpretation also included other factors that are of importance for decision of transmission. Such a factor is of course whether one from the mobile terminal (201 in Figure 2) received frame is received faulty, that is corrupted, or not. An indicator for this factor is called BFI-indicator.

In a decision step 405, the SP-, SID- and BFI-indicators are utilised according to the following simple logic:

- If SP is zero and SID is the same as a SID from preceding received speech frame; do not transmit the current TDMA-frame.
- If SP is zero and the difference between the contents in the current SID-indicated frame and a preceding received SID-indicated frame; do not transmit the current TDMA-frame.

- If the BFI-indicator indicates a corrupt frame received from the mobile terminal (201 in Figure 2); do not transmit the current TDMA-frame.

All other information is transmitted according to the steps below, with start in a step 407 for arranging packets. In the step 407 for arranging packets, the TDMA-frames are arranged in data packets according to the to expert well known IP-standard, that is, IP-packets, at which for instance an IP-address for receiving unit is connected to the IP-packet. The intended addressee is preferably the receiving base control unit, and more exactly its gate (211 in Figure 2).

In a transmission step 409, the TDMA-frames arranged in IP-packets are transmitted via the IP-network (209 in Figure 2) according to well known and standardised IP-technology.

In a reception step 411, the IP-packets are received, according to well known IP-technology, by the addressee, which in this example consists of the second gate (211 in Figure 2) connected to the base control unit (213 in Figure 2).

In a recreating step 413, the in the radio base station created TDMA-frames are recreated from the information in the received IP-packets, after which the base control unit (213 in Figure 2) forwards the information according to previously discussed GSM-technology via the mobile services switching centre (215 in Figure 2) to the second terminal (219 in Figure 2) connected to the telecommunication network (217 in Figure 2).

Even if only GSM-systems have been discussed above, it is a matter of course to the expert in the field to apply this invention in other telecommunication systems. It is possible to forestall implementation in all systems in which the equivalence of DTX is utilised.

PATENT CLAIMS

1. Procedure for control of transmission of information in a transmitting subnetwork (102) in a digital time division multiplex mobile communication system (100), at which the subnetwork (102) transmits frames containing information from a station (110,112,201) in a radio subnetwork (101) to an adaptation unit (126,213) in the transmitting subnetwork (102), c h a r a c t e r i s e d in that it includes the steps:

- reception of information frames from the radio subnetwork (101),

- interpretation of at least a fraction of the content in the information frames, at which the interpretation at least determines one type of frame for each of the received information frames, at which the type of frame is one of at least three types of frames, at which a first type of frame is a speech frame that includes sound information, a second type of frame is a silence frame that includes silence information, and a third type of frame is a faulty frame that includes a frame error indicator;

- transmission of information in the received information frames, at which the transmission is made depending on the interpretation.

2. Procedure as claimed in patent claim 1, at which the second type of frame is determined, further c h a r a c t e r i s e d in that the interpretation includes:

- analysis of the silence information, at which a comparison is made between silence information in the latest received silence frame with silence information in a previously received silence frame, at which the comparison results in a measure of concordance, and that the transmission of the information in the latest received

silence frame is made depending on the measure of concordance.

3. Procedure as claimed in patent claim 1, at which the third type of frame is determined, further c h a r a c t e r i s e d in that the interpretation includes:

- analyses of the frame error indicator, and that the transmission of the information in the latest received information frame is made depending on the frame error indicator.

4. Procedure as claimed in any of the patent claims 1-3, further c h a r a c t e r i s e d in that the transmission of the information is preceded by the step:

- division of the information into data packets, and that the transmission of the information is made via a packet switched network part to the adaptation unit.

5. Procedure as claimed in patent claim 4, further c h a r a c t e r i s e d in that the division of the information and the transmission is made according to the Internet Protocol.

6. Device for control of transmission of information in a transmitting subnetwork (102) in a digital time division multiplex mobile communication system (100), at which the subnetwork (102) includes devices for transmission of frames containing information from a station (110,112,201) in a radio subnetwork (101) to an adaptation unit (126,213) in the transmitting subnetwork (102), c h a r a c t e r i s e d in that it includes:

- devices (118, 205) for reception of information frames from the radio subnetwork (101),
- device (207) for interpretation of at least a fraction

of the content in the information frames, at which the interpretation at least determines one type of frame for each of the received information frames, at which the type of frame is one of at least three types of frames, at which a first type of frame is a speech frame, which includes sound information, a second type of frame is a silence frame, which includes silence information, and a third type of frame is a faulty frame, which includes a frame error indicator.

- device (207) for transmission of information in the received information frames, at which the transmission is made dependent on the interpretation.

7. Device as claimed in patent claim 6, further c h a r a c t e r i s e d in that the devices (207) for the interpretation include:

- device for analysis of the silence information, including devices for comparison between silence information in the latest received silence frame with silence information in a previously received silence frame, at which the comparison results in a measure of concordance, and that the devices for the transmission of the information in the latest received silence frame includes device to take the measure of concordance into consideration.

8. Device as claimed in patent claim 6, further c h a r a c t e r i s e d in that the devices (207) for the interpretation include:

- device for analysis of the frame error indicator, and that the devices for transmission of the information in the latest received information frame include device to take the frame error indicator into consideration.

9. Device as claimed in any of the patent claims 6-8, further c h a r a c t e r i s e d in that:

- devices for division of the information into data packets, and that the devices for the transmission of the information include device for tranmission via a packet switched network part (209) to the adaptation unit (126,213).

10. Device as claimed in patent claim 9, further c h a r a c t e r i s e d in that the devices for the division of the information, and the devices for the transmission include devices for division and allocation according to the Internet Protocol.

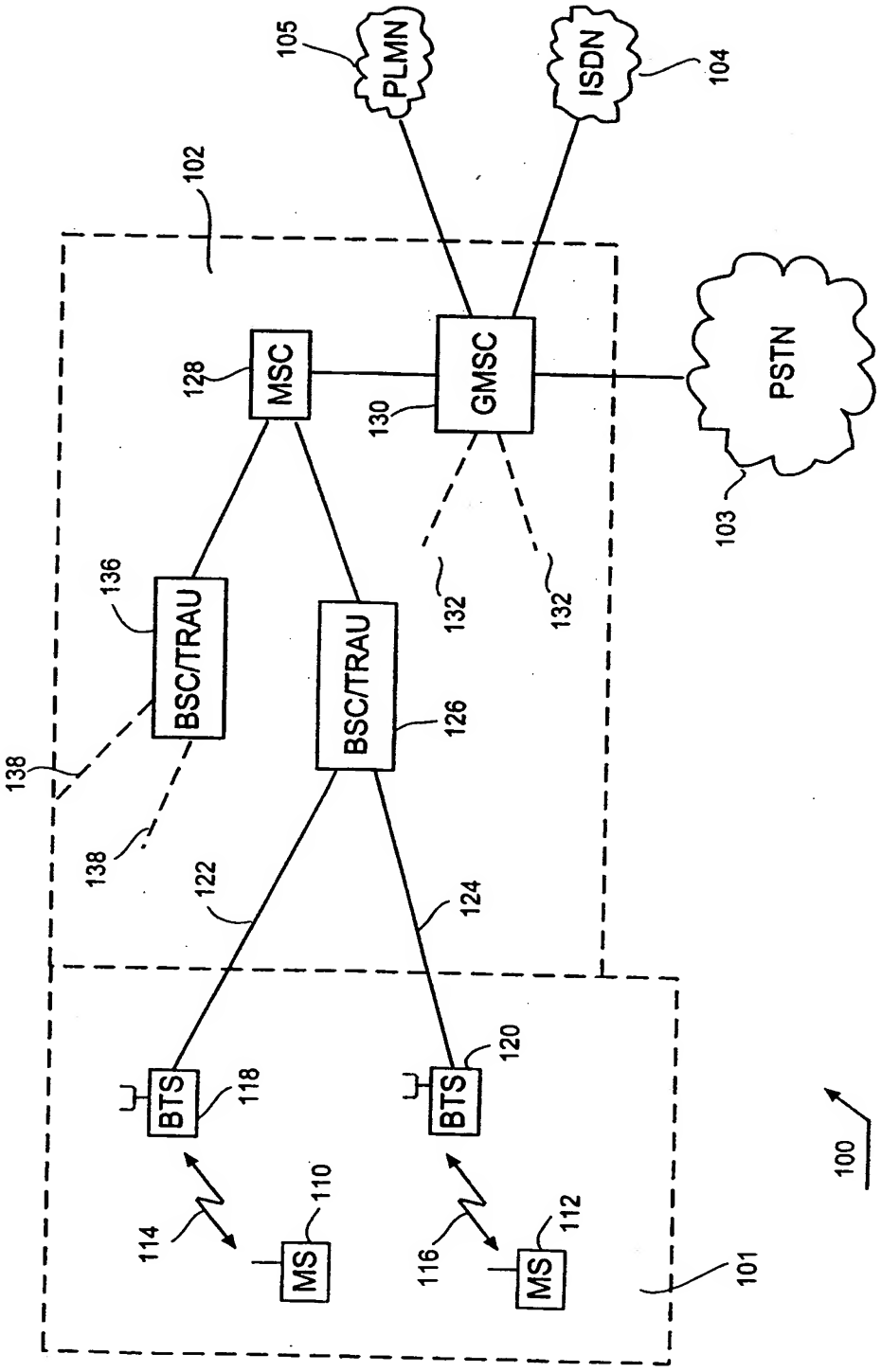

PLMN
ISDN
PSTN
GMSC
MSC
BSC/TRAU
BSC/TRAU
BTS
BTS
MS
MS
102
103
104
105
100
101
110
112
114
116
118
120
122
124
126
128
130
132
132
136
138
138

Figure 1

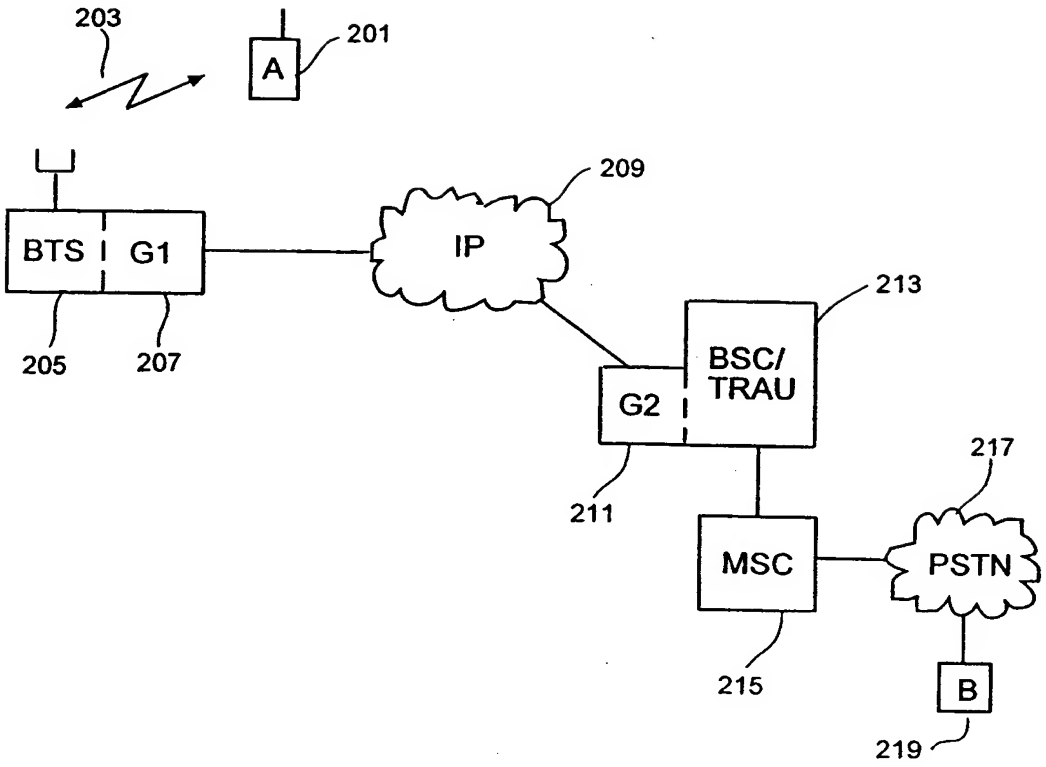


Figure 2

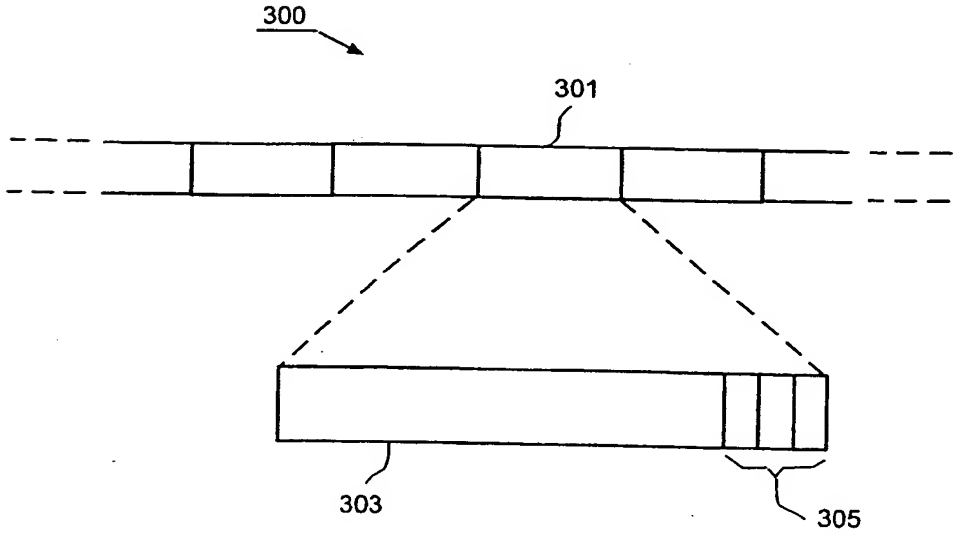


Figure 3

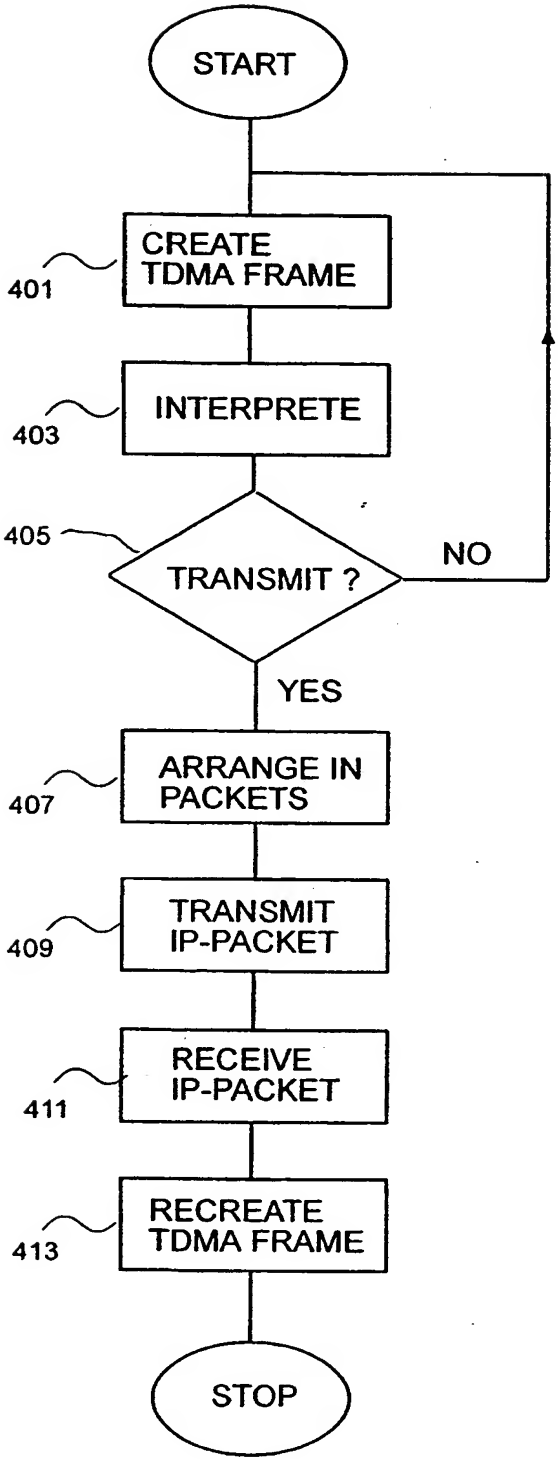


Figure 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 00/00742

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04Q 7/30, H04L 12/56
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04Q, H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 9728664 A1 (NOKIA TELECOMMUNICATIONS OY), 7 August 1997 (07.08.97), page 1, line 18 - line 26; page 1, line 27 - page 2, line 4; page 4, line 35 - page 5, line 9, page 7, line 36 - page 8, line 2	1,6
Y		2-5,7-10
	--	
A	WO 9635310 A1 (INTERWAVE COMMUNICATIONS INTERNATIONAL LTD.), 7 November 1996 (07.11.96), page 8, line 4 - line 6	5,10
	--	

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" erlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
7 August 2000	16 -08- 2000
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Authorized officer PETER HEDMAN/EE Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 00/00742

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 9628809 A1 (TELEFONAKTIEBOLAGET LM ERICSSON), 19 Sept 1996 (19.09.96), page 4, line 24 - line 34; page 9, line 33 - page 10, line 2, figure 2	2-5,7-10
A		1
	--	
A	M. MOULY, M.B. PAUTET, "The GSM System for Mobile Communications", 1992, subsection 3.3.2.2, page 164, last paragraph	2-5,7-10
	--	
P,X	WO 9935875 A1 (NOKIA TELECOMMUNICATIONS OY), 15 July 1999 (15.07.99), page 11, line 16 - line 24, abstract, page 1, paragraph 1; page 4, last paragraph	1-10
	--	
A	WO 9841046 A2 (NOKIA TELECOMMUNICATIONS OY), 6 March 1998 (06.03.98), page 9, line 8 - line 14; page 2, line 3 - line 16; page 3, line 15 - line 23, figure 3, abstract, page 5, line 21 - line 35; page 6, line 16, - line 17; page 6, line 24 - line 26; page 9, line 8 - line 14	1-10
	--	
A	US 5299198 A (S.E. KAY ET AL), 29 March 1994 (29.03.94), column 2, line 58 - line 61; column 4, line 48 - line 52; column 7, line 21 - line 31, column 7, line 42 - line 56; column 18, line 1 - line 6; figure 3	1-10
	--	
A	WO 9300778 A1 (GPT LIMITED), 7 January 1993 (07.01.93), abstract, page 4, paragraph 2 - paragraph 3	1-10
	--	
A	EP 0662778 A2 (NTT MOBILE COMMUNICATIONS NETWORK INC.), 12 July 1995 (12.07.95), figure 5, abstract	1-10
	--	

INTERNATIONAL SEARCH REPORT

Information on patent family members

02/12/99

International application No.
PCT/SE 00/00742

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9728664 A1	07/08/97	AU 1548097 A	22/08/97
		DE 29710804 U	04/12/97
		EP 0886980 A	30/12/98
		FI 2664 U	29/11/96
		FI 960404 A,V	30/07/97
WO 9635310 A1	07/11/96	AU 5726296 A	21/11/96
		AU 5726696 A	21/11/96
		AU 5853496 A	21/11/96
		AU 5918896 A	21/11/96
		CA 2219791 A	07/11/96
		CA 2219792 A	07/11/96
		CA 2219793 A	07/11/96
		CA 2219879 A	07/11/96
		CN 1196154 A	14/10/98
		CN 1196157 A	14/10/98
		EP 0824832 A	25/02/98
		EP 0824835 A	25/02/98
		EP 0826291 A	04/03/98
		EP 0826292 A	04/03/98
		US 5734699 A	31/03/98
		US 5818824 A	06/10/98
		US 5842138 A	24/11/98
		US 5887256 A	23/03/99
		US 5953651 A	14/09/99
		WO 9635298 A	07/11/96
		WO 9635301 A	07/11/96
		WO 9635309 A	07/11/96
		AU 5675496 A	21/11/96
		CA 2219885 A	07/11/96
		CN 1196156 A	14/10/98
		EP 0829178 A	18/03/98
		US 5577029 A	19/11/96
		US 5761195 A	02/06/98
		WO 9635311 A	07/11/96

INTERNATIONAL SEARCH REPORT

Information on patent family members

02/12/99

International application No.
PCT/SE 00/00742

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9628809 A1	19/09/96	AU 688082 B	05/03/98
		AU 3089695 A	23/05/96
		AU 5018196 A	02/10/96
		BG 101466 A	30/09/97
		BR 9509555 A	16/09/97
		EP 0790885 A	27/08/97
		SE 0790885 T3	
		EP 0819302 A	21/01/98
		FI 971821 A	02/05/97
		JP 10508262 T	18/08/98
		LV 11889 A	20/12/97
		NO 971909 A	25/04/97
		PL 320003 A	01/09/97
		SE 9500858 A	11/09/96
		SI 9520120 A	31/10/97
		SK 53897 A	05/11/97
WO 9935875 A1	15/07/99	AU 5764698 A	26/07/99
WO 9841046 A2	06/03/98	AU 6625198 A	29/09/98
		NO 994406 D	00/00/00
US 5299198 A	29/03/94	US 5357513 A	18/10/94
		US 5475689 A	12/12/95
		US 5513183 A	30/04/96
		US 5537509 A	16/07/96
		US 5633873 A	27/05/97
		US 5703881 A	30/12/97
WO 9300778 A1	07/01/93	DE 69228729 D,T	29/07/99
		EP 0544884 A,B	09/06/93
		ES 2129449 T	16/06/99
		JP 6500911 T	27/01/94
EP 0662778 A2	12/07/95	CN 1129876 A	28/08/96
		JP 7245628 A	19/09/95
		US 5615210 A	25/03/97